

# Trachoma: Still A Major Cause of Preventable Blindness

Moving toward a world without blinding trachoma.

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**T**rachoma is a disease caused by poor hygiene that affects those living in the most destitute conditions. It has disappeared from most developed countries. In 1998, the Global Elimination of Trachoma by 2020 (GET 2020) initiative was launched by the World Health Organization (WHO; Geneva, Switzerland).<sup>1</sup> It advocates the control of trachoma at the community level using a four-pronged approach, known as the *SAFE strategy*: Surgery for trichiasis, Antibiotics for active trachoma, Facial cleanliness, and Environmental improvement (Figure 1).

Trachoma is a form of keratoconjunctivitis caused by ocular infection with *Chlamydia trachomatis*. Repeated or persistent episodes lead to increasingly severe inflammation



Figure 1. The SAFE strategy has been implemented to control trachoma and consists of: Surgery for trichiasis, Antibiotics for active or inflammatory trachoma, Facial cleanliness, and Environmental improvements.<sup>2</sup>

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that progresses to scarring of the upper tarsal conjunctiva. Trichiasis develops when scarring distorts the upper eyelid and causes one or more lashes to abrade the cornea, which then also becomes scarred. The ensuing blindness is irreversible. The various components of the SAFE strategy attempt to disrupt the cycle of infection, re-infection, scarring, and trichiasis and have been proven effective in lessening the burden of blinding diseases.<sup>3</sup>

## EPIDEMIOLOGY

Much progress has been made in reducing the global burden of infectious blindness, of which trachoma is the principal cause (Figure 2).<sup>4</sup> In 1995, trachoma was directly responsible for 15% of blindness, making it the second leading blinding disease worldwide, behind cataract.<sup>4</sup> Trachoma is still a major cause of blindness, but the combination of primary health interventions based on the SAFE strategy and an overall improvement in the standard of living worldwide, together with an increase in some other age-related diseases, have reduced trachoma's contribution to 4% of all blindness.<sup>5</sup> In absolute terms, 7 million people were diagnosed blind from trachoma 1 decade ago, and this number has been reduced to less than 2 million people. Data taken at the national level in the Gambia and Malawi support the magnitude of this decline in blinding trachoma, and both countries have implemented the SAFE strategy widely.<sup>6,7</sup>

Blinding trachoma vanished from the developed world during the first half of the last century. This suppression occurred as a result of socioeconomic improvements rather than because of medical interventions such as the SAFE strategy or the ever-growing use of antibiotics. The reduction in worldwide trachomatous blindness during the last decade is partially attributable to gradual socioeconomic improvements as well. However, poor hygiene and overcrowding are still rife as a result of poverty, and a portion of the decrease must be due to the implementation of the various components of the SAFE strategy. Nonetheless, there is still much to be done if the goal of eliminating blinding trachoma by the year 2020 is to be achieved.

### THE SAFE STRATEGY

The SAFE strategy utilizes a range of primary healthcare interventions to control trachoma. Surgery is required to prevent blindness in individuals who, as a result of childhood infections, have already developed trichiasis. The other components target the elimination of chlamydial infection and active trachoma by disrupting the cycle of rapid and repeated infection. Modelling the cost effectiveness of the SAFE strategy suggests that although surgery is economical as a “stand-alone intervention,” mass antibiotic treatment is only efficacious when azithromycin is donated.<sup>8</sup>

The SAFE strategy is delivered within the framework of a primary healthcare program. Although each element of the program must be tailored to conform to local social and cultural concerns, the key strategies that underpin the SAFE strategy remain constant. Determining the prevalence of active trachoma and trichiasis is the first step and provides data that allow interventions to be targeted to the areas of greatest need. Estimating the prevalence of trachoma needs to be efficient and cost effective. A number of techniques are available. Prevalence surveys are the gold standard, but they are expensive, time consuming, and ineffective at detecting the elimination of disease.<sup>9</sup> Trachoma Rapid Assessment<sup>10</sup> is probably the most effective method for quickly and cheaply prioritizing areas for intervention. This assessment also carries the benefit of accurately detecting the elimination of disease.<sup>11</sup>

### FOUR COMPONENTS

#### Surgery

The implementation of a surgical program does not always occur alongside the adoption of the other components of SAFE, because it should be targeted to those areas with the greatest aggregate number of trichiasis cases.<sup>10</sup> The WHO recommends the bilamellar tarsal-rotation procedure.<sup>12</sup> This procedure effectively delays the progression

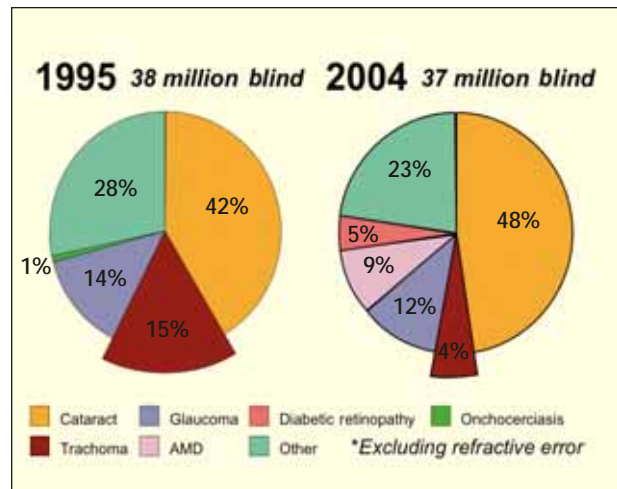


Figure 2. This chart represents a comparison of global data on the causes of blindness as estimated in 1995<sup>4</sup> and 2004.<sup>5</sup> The number of people blind in the world has remained relatively stable. However, there has been a reduction in the rate of infectious blindness, of which trachoma is the major cause.

toward blindness and alleviates symptoms (Figure 3).<sup>13</sup> Trachomatous scarring, distortion of the upper eyelid, and trichiasis tend to be progressive. Despite surgery, recurrent trichiasis is common, occurring in approximately 40% of individuals followed for 3 to 4 years.<sup>14</sup> This may be a result of either the disease's progressiveness or inadequate surgery, and the provision of surgery in individuals with trichiasis should be followed by regular or annual examinations for recurrence. Furthermore, only a small percentage of those people requiring surgery elect to show up for their operation, even when provided free of charge.<sup>15,16</sup> Many barriers, including fear, lack of knowledge regarding the disease or the possibility of treatment, cost (both direct and to the accompanying family), and difficulties with travel all contribute to the low acceptance of surgery.<sup>17,18</sup> Offering surgery at the village level rather than at regional health centers, may help to increase attendance.<sup>19</sup> Program managers should consider this concept and other measures in an effort to maximize the uptake of surgery.

### Antibiotics, Facial Cleanliness, and Environmental Improvements

Antibiotic distribution, face-cleanliness campaigns, and environmental improvements target those areas with the highest rate of active trachoma in children.<sup>10</sup> *The Cochrane Database of Systemic Review* indicates that there have been only a few prospective, randomized, controlled trials reported that have assessed these measures in reducing active trachoma.<sup>20-22</sup> However, the application

of strict protocol in accepting trials for analysis, demanding both transparent randomization and a well-designed control arm, means that many good data have been excluded from the Cochrane analysis. For instance, 2 years after 98% of individuals received antibiotics in a Tanzanian village the rate of chlamydial infection in the village had fallen from 10.0% to less than 0.5%.<sup>23</sup> Admittedly, such rates of coverage may not be achieved outside the research setting, but it does provide strong support for the benefit of mass antibiotic distribution.

In the developing world, children with dirty faces have up to a three-fold increased risk of developing severe trachoma compared with children with clean faces,<sup>24-26</sup> and children who wash their faces regularly are less likely to have trachoma.<sup>27</sup> Therefore, encouraging children to keep their faces clean should be a cheap way to reduce the transmission of *Chlamydia trachomatis* at the community level. This hypothesis is supported by evidence from a study in Tanzania in which communities received either antibiotics alone or antibiotics in conjunction with a clean-face intervention program. The communities that received both interventions had a significantly lower rate of severe trachoma than communities that received antibiotics alone.<sup>28</sup>

Evidence supporting the benefit of environmental improvements is also limited. However, history demonstrates that trachoma disappeared with the improvement of environmental conditions in developed nations. There has been some success in building adequate latrines and other initiatives directed at helping to reduce the fly population.<sup>29</sup> The fly *Musca Sorbens* is known to carry chlamydia<sup>30</sup> and



Figure 3. Blinding trachoma is still endemic in remote indigenous communities of Australia. This elderly blind Aboriginal woman is one of the thousands affected.

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has a high rate of contact with human eyes.<sup>31</sup> Household fly density is a known risk factor for trachoma.<sup>25</sup> It has been shown that by controlling the fly population, thereby decreasing the transmission of chlamydia, the burden of active trachoma in a community can be reduced.<sup>32</sup> Other environmental improvements are aimed at providing reliable and clean water for washing and combatting overcrowding by limiting the sharing of households by humans and animals.

## CONCLUSION

Communities with a high prevalence of trachoma need to be rapidly identified and prioritize for the implementation of the SAFE strategy. Surgical programs should be instituted where the highest aggregate number of people with trichiasis reside. The A, F, and E components of SAFE should be instituted in those communities that display a high rate of the active disease. Much progress has been made through the utilization of the tools of the SAFE strategy, thus demonstrating its effectiveness. However, if the goal of a world without blinding trachoma is to be achieved by the year 2020, then even more must be done. ■

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